

AMENDMENTS TO THE CLAIMS

## Claims 1-60 (Cancelled)

61. (New) A modular apparatus for painting surfaces of a vehicle body moved along a path comprising:

- a pair of frame rails mounted on opposite sides of and extending generally parallel to the path of movement of the vehicle body, said frame rails being located above a plane of an upper surface of the vehicle body as the vehicle body travels the path, said frame rails being connected together in a rigid frame structure that prevents movement of one of said frame rails relative to another of said frame rails, prevents movement of said frame rails relative to said plane, and minimizes a width of said rigid frame structure relative to a width of the vehicle body;
- a first and a second robot arm mounted on an associated one of each of said frame rails, each of said first and second robot arms being movable along said associated frame rail and having a shoulder axis and an elbow axis for movement in a generally vertical plane transverse to the path of movement of the vehicle body, said shoulder axes being positioned below said associated frame rail; and
- a paint applicator mounted on each of said first and second robot arms for dispensing paint whereby each of said first and second robot arms is sized to move said paint applicator relative to the vehicle body while said paint applicators dispense paint to cover the upper surface and adjacent side surfaces of the vehicle body with the paint.

62. (New) The apparatus according to Claim 61 wherein each of said first and second robot arms includes a wrist mounting said paint applicator, said wrist having a rotating axis and a tilting axis for moving said paint applicator relative to the vehicle body.

63. (New) The apparatus according to Claim 61 wherein each of said first and second robot arms moves in a generally vertical plane transverse to the path of movement of the vehicle body to dispense the paint.

64. (New) The apparatus according to Claim 61 wherein said frame rails are mounted on walls of a paint booth extending generally parallel to the path of movement of the vehicle body.

65. (New) The apparatus according to Claim 61 wherein said frame rails are mounted on floor engaging legs.

66. (New) The apparatus according to Claim 61 wherein said frame rails are tubular.

67. (New) The apparatus according to Claim 61 wherein said frame rails are connected by at least one cross support member located above the plane of the upper surface of the vehicle body.

68. (New) The apparatus according to Claim 67 wherein said frame rails and said at least one cross support member are tubular.

69. (New) The apparatus according to Claim 61 including control means maintaining said first and second robot arms in opposition to provide symmetric painting of the vehicle body.

70. (New) The apparatus according to Claim 61 wherein each said shoulder axis extends parallel to and is offset horizontally from an axis of travel along said associated frame rail.

71. (New) The apparatus according to Claim 61 wherein each said shoulder axis extends parallel to and is offset horizontally from an axis of travel along said associated frame rail toward the path of movement of the vehicle body.

72. (New) A modular apparatus for painting a vehicle body having an upper surface and opposed side surfaces and being conveyed along a path comprising:

- a pair of frame rails extending along opposite sides of and generally parallel to the path of conveyance of the vehicle body;
- at least two legs attached to each said frame rail for supporting said frame rails above a plane of the upper surface of the vehicle body on the path;
- at least one cross member fixedly connecting said frame rails together as a rigid frame structure that prevents movement of said frame rails, fixes said frame rails relative to one another and to said plane, and minimizes a width of said rigid frame structure relative to a width of the vehicle body;
- at least one robot arm located on an associated one of each of said frame rails, said at least one robot arm being movable along said associated frame rail generally parallel to the path and being pivoted at a shoulder axis positioned below said associated frame rail; and
- a paint applicator mounted on each said at least one robot arm for applying paint to the vehicle body whereby each of said at least one robot arms pivots at said shoulder in a generally vertical plane to permit each of said at least one robot arms to reach said paint applicator to all paintable areas on the upper surface and an adjacent one of the side surfaces of the vehicle body.

73. (New) The apparatus according to Claim 72 wherein each of said at least one robot arm has an inner arm portion pivoted at one end at said shoulder axis and pivotally connected at an opposite end to an outer arm portion at an elbow axis.

74. (New) The apparatus according to Claim 72 wherein each said at least one robot arm includes a process controller mounted for movement therewith along said associated frame rail.

75. (New) The apparatus according to Claim 74 wherein said at least one cross support member is hollow and receives cables and conduits connecting said process controllers together.

76. (New) The apparatus according to Claim 74 wherein said at least one cross support member is tubular and purged with an inert gas or air for explosion protection.

77. (New) The apparatus according to Claim 72 wherein each said at least one robot arm includes a wrist connecting a free end of said at least one robot arm and said paint applicator, said wrist having two axes of motion.

78. (New) The apparatus according to Claim 72 wherein each said at least one robot arm has only four axes of motion including said shoulder axis for orienting said paint applicator relative to the vehicle body.

79. (New) The apparatus according to Claim 72 wherein each said shoulder axis extends parallel to and is offset horizontally from an axis of travel along said associated frame rail.

80. (New) The apparatus according to Claim 72 wherein each said shoulder axis extends parallel to and is offset horizontally from an axis of travel along said associated frame rail toward the path.

81. (New) A modular apparatus for painting surfaces of a vehicle body moved along a path through a paint booth comprising:

a pair of frame rails mounted on opposite sides of and extending generally parallel to the path of movement of the vehicle body through the paint booth, said frame rails being fixedly located above a plane of an upper surface of the vehicle body as the vehicle body travels the path;

a first and a second robot arm mounted on an associated one of each of said frame rails, each of said first and second robot arms being movable along said associated frame rail and having a shoulder axis and an elbow axis for movement in a generally vertical plane transverse to the path of movement of the vehicle body, said shoulder axes being positioned below said associated frame rail;

a paint applicator mounted on each of said first and second robot arms for dispensing paint whereby said first and second robot arms are sized to move said paint applicators relative to the vehicle body while said paint applicators dispense paint to cover the upper surface and an adjacent side surface of the vehicle body with the paint; and

control means connected to each of said first and second robot arms for selectively dispensing the paint in a normal mode wherein different areas of the upper surface and the adjacent side surface are covered by said paint applicators of each of said first and second robot arms and a degraded mode wherein the upper surface and the adjacent side surface are covered by said paint applicator of one of said first and second robot arms.

82. (New) The apparatus according to Claim 81 wherein said first robot arms are positioned in opposition and said second robot arms are positioned in opposition to provide symmetric painting of the vehicle body.

83. (New) The apparatus according to Claim 81 wherein said control means includes a separate process controller mounted on an associated one of each of said first and second robot arms for movement along said associated frame rail, each said process controller operating said associated robot arm in the normal mode and the degraded mode.

84. (New) The apparatus according to Claim 81 wherein each of said first and second robot arms includes a wrist mounting said paint applicator, said wrist having a rotating axis and a tilting axis for moving said paint applicator relative to the vehicle body.

85. (New) The apparatus according to Claim 81 wherein said frame rails are mounted on walls of a paint booth extending generally parallel to the path of movement of the vehicle body.

86. (New) The apparatus according to Claim 81 wherein said frame rails are mounted on floor engaging legs.

87. (New) The apparatus according to Claim 86 wherein frame rails are connected by at least one cross support member located above the plane of the upper surface of the vehicle.

88. (New) The apparatus according to Claim 87 wherein said frame rails and said at least one cross support member are tubular and receive cables and conduits connecting said first and second robot arms together.

89. (New) The apparatus according to Claim 81 wherein each of said first and second robot arms has four axes of movement including said shoulder axis and an elbow axis defining a planar operating space for said paint applicator transverse to the path of movement of the vehicle body and including a wrist rotating axis and a wrist tilting axis for moving said paint applicator.